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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/784,288 | KUWAHARA ET AL. | |
| | Examiner | Art Unit | |
| | Brian Goldberg | 2861 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *21 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/21/07 has been entered.

### *Drawings*

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the main controlling unit (formed on each liquid discharger), secondary controlling unit (formed on each liquid discharger), secondary-control executing unit, discharge-direction changing unit, reference-direction setting unit, discharge-angle setting unit, and resolution increasing unit must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. Applicant has referenced Fig. 21 as showing all of the above features. However, it is unclear to the examiner which elements of Fig. 21 represent each of the features listed above. Furthermore, Figs. 3A, 3B, 6, 7, 8A, 8B, 9, and 15 merely demonstrate the results of using each of the above features, not the features themselves.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objections***

3. Claims 1, 12, 13, and 20 are objected to because they recite the limitation: "the main controlling unit controlling the discharge of droplets from the respective nozzle." There is insufficient antecedent basis for "the respective nozzle" in the claim. Also, the limitation is not supported by the specification. Throughout the specification, the main controlling unit is only referred to controlling the discharge of droplets from the nozzles, not from "the respective nozzle". For example, see in paragraph [0061] (cited by the applicant for support of the claimed feature): "a main controlling unit, which is formed on each liquid discharger, for controlling the ***nozzles*** 18 of the liquid discharger (emphasis added)." This is an example of only one instance of many in which the specification

refers to the nozzles of the liquid discharger, meaning more than one nozzle of the single liquid discharger. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-12, 14, and 16-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamada et al. (US 20020021324).

3. Regarding claim 1, Yamada et al. disclose "a liquid discharge apparatus (10 of Fig 1) having a head (200 of Fig 1) with a plurality of liquid dischargers aligned in a row each liquid discharger including a nozzle (230 of Fig 2), comprising: a main controlling unit (500 of Fig 1) formed on each liquid discharger, the main controlling unit controlling the discharge of droplets from the respective nozzle; a secondary controlling unit (400, 600 of Fig 1) formed on each liquid discharger, the secondary controlling unit controlling the discharge of a droplet so that the droplet is discharged along at least one secondary direction different from a main direction of the droplets discharged by said each liquid discharger controlled by the main controlling unit (see Par [0051] and [0057] and Fig 7); and a secondary-control executing unit for individually setting whether or not the secondary controlling unit for each liquid discharger is operated (610, 620 of Fig 1)."

4. Regarding claim 2, Yamada et al. disclose "a discharge-direction changing unit (632, 640 of Fig 1) for changing a direction of a droplet discharged from the nozzle of

each liquid discharger in at least two different directions in the row (see Fig 7, Par [0077] and [0078]); and a reference-direction setting unit for individually selecting for said each liquid discharger one of the directions of the droplet discharged from said each liquid discharger controlled by the discharge-direction changing unit, as a reference direction (420 of Fig 1)."

5. Regarding claim 3, Yamada et al. disclose "a discharge-direction changing unit (632, 640 of Fig 1) for changing a direction of a droplet discharged from the nozzle of each liquid discharger in at least two different directions in the row (see Fig 7, Par [0077] and [0078]); and a discharge-angle setting unit (621 of Fig 1) for individually selecting for said each liquid discharger discharge angles for said droplet discharged from said each liquid discharger controlled by the discharge-direction changing unit (431, 432, 631, 632 of Fig 1)."

6. Regarding claim 4, Yamada et al. disclose "a discharge-direction changing unit (632, 640 of Fig 1) for changing a direction of a droplet discharged from the nozzle of each liquid discharger in at least two different directions in the row (see Fig 7, Par [0077] and [0078]); a discharge-angle setting unit (621 of Fig 1) for individually setting for said each liquid discharger discharge angles for said droplet discharged from said each liquid discharger controlled by the discharge-direction changing unit (431, 432, 631, 632 of Fig 1); and a reference-direction setting unit for individually selecting for said each liquid discharger one of the directions of the droplet discharged from said liquid discharger controlled by the discharge-direction changing unit, as a reference direction (420 of Fig 1)."

7. Regarding claim 5, Yamada et al. disclose "a discharge controlling unit (620, 630, 640 of Fig 1) for controlling the discharge of ink droplets by the discharge-direction changing unit (632, 640 of Fig 1) so that a pixel row or a pixel is formed by discharging droplets from at least two neighboring liquid dischargers, wherein droplets are discharged along different directions from at least two neighboring liquid dischargers to form a pixel row by landing on the same pixel row or to form a pixel by landing on a same pixel area (see Par [0062], [0064], [0065])."

8. Regarding claim 6, Yamada et al. disclose "a discharge controlling unit (620, 630, 640 of Fig 1) for controlling the discharge of a droplet by the discharge-direction changing unit (632, 640 of Fig 1) so that the droplet lands in a landing position in a pixel area, wherein the landing position is one of M (where M is an integer greater or equal to two) different landing positions aligned in a predetermined direction in the pixel area and at least a part of each of the M landing positions is included in the pixel area (see Par [0062], [0064], [0065], [0071])."

9. Regarding claim 7, Yamada et al. disclose "a first discharge controlling unit (620, 630, 640 of Fig 1) for controlling the discharge of ink droplets by the discharge-direction changing unit (632, 640 of Fig 1) so that a pixel row or a pixel is formed by discharging droplets from at least two neighboring liquid dischargers, wherein droplets are discharged along different directions from at least two neighboring liquid dischargers to form a pixel row by landing on the same pixel row or to form a pixel by landing on the same pixel area (see Par [0062], [0064], [0065]); and a second discharge controlling unit for controlling the discharge of a droplet by the discharge-direction changing unit so

that the droplet lands in a landing position in a pixel area, wherein the landing position is one of M (where M is an integer greater or equal to two) different landing positions aligned in a predetermined direction in the pixel area and at least a part of each of the M landing positions is included in the pixel area (see Par [0062], [0064], [0065], [0071])."

10. Regarding claim 8, Yamada et al. disclose "a resolution increasing unit for increasing a number of pixels by controlling the droplets discharged from each liquid discharger so that the droplets land in at least two different positions in a predetermined direction whereby the number of pixels is increased in comparison with the number of pixels formed by droplets discharged from each liquid discharger landing in one position (see Par [0062], [0064], [0065], [0071])."

11. Regarding claim 9, Yamada et al. disclose "a resolution increasing unit for increasing a number of pixels by controlling the droplets discharged from each liquid discharger so that the droplets land in at least two different positions in a predetermined direction whereby the number of pixels is increased in comparison with the number of pixels formed by droplets discharged from each liquid discharger landing in one position (see Par [0062], [0064], [0065], [0071]), and a discharge controlling unit (620, 630, 640 of Fig 1) for controlling the discharge of ink droplets by the discharge-direction changing unit so that a pixel row or a pixel is formed by discharging droplets from at least two neighboring liquid dischargers, wherein droplets are discharged along different directions from at least two neighboring liquid dischargers to form a pixel row by landing on the same pixel row or to form a pixel by landing on a same pixel area (see Par [0062], [0064], [0065])."

12. Regarding claim 10, Yamada et al. disclose "a resolution increasing unit for increasing a number of pixels by controlling the droplets discharged from each liquid discharger so that the droplets land in at least two different positions in a predetermined direction whereby the number of pixels is increased in comparison with the number of pixels formed by droplets discharged from each liquid discharger landing in one position (see Par [0062], [0064], [0065], [0071]); and a discharge controlling unit for controlling the discharge of a droplet by the discharge-direction changing unit so that the droplet lands in a landing position in a pixel area, wherein the landing position is one of M (where M is an integer greater or equal to two) different landing positions aligned in a predetermined direction in the pixel area and at least a part of each of the M landing positions is included in the pixel area (see Par [0062], [0064], [0065], [0071])."

13. Regarding claim 11, Yamada et al. disclose "a resolution increasing unit for increasing a number of pixels by controlling the droplets discharged from each liquid discharger so that the droplets land in at least two different positions in a predetermined direction whereby the number of pixels is increased in comparison with the number of pixels formed by droplets discharged from each liquid discharger landing in one position (see Par [0062], [0064], [0065], [0071]); a first discharge controlling unit (620, 630, 640 of Fig 1) for controlling the discharge of ink droplets by the discharge-direction changing unit (632, 640 of Fig 1) so that a pixel row or a pixel is formed by discharging droplets from at least two neighboring liquid dischargers, wherein droplets are discharged along different directions from at least two neighboring liquid dischargers to form a pixel row by landing on the same pixel row or to form a pixel by landing on a same pixel area (see

Par [0062], [0064], [0065]); and a second discharge controlling unit for controlling the discharge of a droplet by the discharge-direction changing unit (632, 640 of Fig 1) so that the droplet lands in a landing position in a pixel area, wherein the landing position is one of M (where M is an integer greater or equal to two) different landing positions aligned in a predetermined direction in the pixel area and at least a part of each of the M landing positions is included in the pixel area (see Par [0062], [0064], [0065], [0071])."

14. Regarding claim 12, Yamada et al. disclose "a liquid chamber (232 of Fig 2) containing the liquid, bubble generation units (235, 310, 320 of Fig 2) disposed inside the liquid chamber for generating bubbles in the liquid contained in the liquid chamber by supplying energy, and a nozzle member provided with nozzles (230 of Fig 2) for discharging the liquid contained in the liquid chamber in response to generation of bubbles by the bubble generation unit, wherein a secondary controlling unit (400, 600 of Fig 1) controls the at least one secondary direction of a droplet discharged by supplying energy having a second value the bubble generation units, second value differs from first value of the energy supplied to the bubble generation units by the main controlling unit, so that the at least one secondary direction of the droplet differs from the main direction of the droplet controlled by the main controlling unit (see Par [0051] and [0057] and Fig 7)."

15. Regarding claim 14, Yamada et al. disclose "a liquid chamber (232 of Fig 2) containing the liquid, bubble generation units (235, 310, 320 of Fig 2) disposed inside the liquid chamber for generating a bubble in the liquid contained in the liquid chamber by supplying energy, and a nozzle member provided with nozzles (230 of Fig 2) for

discharging the liquid contained in the liquid chamber as a bubble is generated by the bubble generation unit, wherein the discharge-direction changing unit (632, 640 of Fig 1) comprises a main controlling unit (500 of Fig 1) for controlling the discharge of droplets from nozzles by supplying energy to the bubble generation units and a secondary controlling unit (400, 600 of Fig 1) for controlling the direction of a droplet discharged by supplying energy having a second value to the bubble generation units, the second value differs from a first value of the energy supplied to the bubble generation units by the main controlling unit, so that the direction of the droplet differs from the direction of the droplet controlled by the main controlling unit (see Par [0051] and [0057] and Fig 7)."

16. Regarding claim 16, Yamada et al. disclose "performing a main control (500 of Fig 1) of a discharge of droplets from the nozzle (230 of Fig 2) of each liquid discharger; performing a secondary control (400, 600 of Fig 1) of the discharge of droplets from each liquid discharger along at least one direction different from a main direction trajectory of the main control in a row (see Par [0051] and [0057] and Fig 7); and individually determining whether or not the secondary controlling unit is operated for each liquid discharger (610, 620 of Fig 1)."

17. Regarding claim 17, Yamada et al. disclose "selecting a direction of droplets discharged from the nozzle of each liquid discharger from at least two different directions in a predetermined direction (see Fig 7, Par [0077] and [0078]); and individually selecting for said each liquid discharger one of the directions as a reference direction (420 of Fig 1)."

18. Regarding claim 18, Yamada et al. disclose "selecting a direction of droplets discharged from the nozzles of each liquid discharger from at least two different directions in a predetermined direction (see Fig 7, Par [0077] and [0078]); and setting a discharge angle (621 of Fig 1) of the droplets independently for said each liquid discharger (431, 432, 631, 632 of Fig 1)."

19. Regarding claim 19, Yamada et al. disclose "selecting a direction of droplets discharged from the nozzle of each liquid discharger from at least two different directions in a predetermined direction (see Fig 7, Par [0077] and [0078]); individually selecting for said each liquid discharger one of the directions as a reference direction (420 of Fig 1); and setting a discharge angle (621 of Fig 1) of the droplets independently for each liquid discharger (431, 432, 631, 632 of Fig 1)."

20. Regarding claims 20 and 21, Yamada et al. disclose "wherein said nozzles are aligned in parallel in a row (see Fig 2)."

***Claim Rejections - 35 USC § 103***

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

22. Claims 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. in view of Ishinaga et al. (US 5754201).

23. Regarding claim 13, Yamada et al. disclose "a liquid chamber (232 of Fig 2) containing the liquid...and a nozzle member provided with nozzles (230 of Fig 2) for

discharging the liquid contained in the liquid chamber as a bubble is generated by the heating elements...and the secondary controlling unit (400, 600 of Fig 1) ...controls the at least one secondary direction of a droplet...so that the secondary direction differs from the main direction controlled by the main controlling unit (500 of Fig 1, see Par [0051] and [0057] and Fig 7)." Thus Yamada et al. meet the claimed invention except providing "heating elements...wherein a plurality of heating elements is aligned in parallel in a row...a circuit with a switching element connected to the serial connection between the heating elements...supplying an electrical current via the circuit to the connection between the heating elements or by receiving an electrical current from the connection to the heating elements to control the electrical current supplied to the heating elements."

24. Ishinaga et al. teach providing "heating elements (4 and 6 of Fig 5a-d)...wherein a plurality of heating elements is aligned in parallel in a row (see Fig 7)...a circuit with a switching element connected to the serial connection between the heating elements (col 5 ln 6-11)...supplying an electrical current via the circuit to the connection between the heating elements or by receiving an electrical current from the connection to the heating elements to control the electrical current supplied to the heating elements (see col 5 ln 6-11 and Fig 5a-d)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to provide the heating elements as outlined above. One would have been motivated to so modify Yamada et al. for the benefit of producing different sized ink drops.

25. Regarding claim 15, Yamada et al. disclose "a liquid chamber (232 of Fig 2) containing the liquid...and a nozzle member provided with nozzles (230 of Fig 2) for discharging the liquid contained in the liquid chamber as a bubble is generated by the heating elements...and the discharge-direction changing unit (632, 640 of Fig 1)...at least two different directions can be selected in a predetermined direction (see Par [0051] and [0057] and Fig 7)." Thus Yamada et al. meet the claimed invention except "heating elements...wherein a plurality of heating elements is aligned in parallel in a row...a circuit with a switching element connected to the serial connection between the heating elements...controlling the electrical current supplied to the heating elements by supplying an electrical current via the circuit to the connection between the heating elements or by receiving an electrical current from the connection between the heating elements."

26. Ishinaga et al. teach providing "heating elements (4 and 6 of Fig 5a-d)...wherein a plurality of heating elements is aligned in parallel in a row (see Fig 7)...a circuit with a switching element connected to the serial connection between the heating elements (col 5 ln 6-11)... controlling the electrical current supplied to the heating elements by supplying an electrical current via the circuit to the connection between the heating elements or by receiving an electrical current from the connection between the heating elements (see col 5 ln 6-11 and Fig 5a-d)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to provide the heating elements as outlined above. One would have been motivated to so modify Yamada et al. for the benefit of producing different sized ink drops.

***Response to Arguments***

27. Applicant's arguments filed 5/21/07 have been fully considered but they are not persuasive. Regarding the drawings, as discussed above and repeated here for completeness, applicant has referenced Fig. 21 as showing all of the above features. However, it is unclear to the examiner which elements of Fig. 21 represent each of the features listed above. Furthermore, Figs. 3A, 3B, 6, 7, 8A, 8B, 9, and 15 merely demonstrate the results of using each of the above features, not the features themselves.

28. As stated in paragraph [0061] (cited by the applicant for support of the claimed feature): "a main controlling unit, which is formed on each liquid discharger, for controlling the ***nozzles*** 18 of the liquid discharger (emphasis added)." This is an example of only one instance of many in which the specification refers to the nozzles of the liquid discharger, meaning more than one nozzle of the single liquid discharger (see also line 4 of the abstract, line 6 of paragraphs [0013] and [0016], paragraph [0251], etc.) Similarly, in paragraph [0046] it is stated that each liquid discharger includes ink chambers, heat-generating-resistors, and a nozzle sheet with nozzles. Therefore, the liquid discharger of the claim can be interpreted to be that which is cited above in Yamada et al. and the secondary-control executing unit cited in Yamada et al. is individually set for each liquid discharger. Similarly, the reference-direction setting unit and the discharge-angle setting unit are individually selected and set respectively for each liquid discharger.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Goldberg whose telephone number is 571-272-2728. The examiner can normally be reached on Monday through Friday, 9AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on 571-272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

**Brian Goldberg**
**AU 2861**
**June 9, 2007**

**MATTHEW LUU**
**SUPERVISORY PATENT EXAMINER**